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SUMMARY OF THE RECORDED DATA ON THE REACTION OF WILD AND CULTIVATED GRASSES TO STEM RUST (PUCCINIA GRAMINIS), LEAF RUST (P.RUBIGOVERA), STRIPE RUST (P. GLUMARUM), AND CROWN RUST (P. CORONATA) IN THE UNITED STATES AND CANADA

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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SUMMARY OF THE RECORDED DATA ON THE REACTION OF WILD AND CULTIVATED GRASSES TO STEM RUST (PUCCINIA GRAMINIS), LEAF RUST (P. RUBIGO-VERA), STRIPE RUST (P. GLUMARUM), AND CROWN RUST (P. CORONATA) IN THE UNITED STATES AND CANADA[1]

George W. Fischer and Moses N. Levine

Plant Disease Reporter
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During the past several decades many botanists and plant pathologists have published data pertaining to the reaction of wild and cultivated grasses, both native and introduced, to the four most common and important graminicolous rusts in the United States and Canada, namely: stem rust (Puccinia graminis Pers.), leaf rust (P. rubigo-vera (D.C.) Wint.), stripe rust (P. glumarum (Schm.) Erikss. and Henn.), and crown rust (P. coronata Cda.). Only a few of the studies involved dealt with the grasses primarily; in most works the grasses have figured more or less incidentally, in recognition of their importance in the spread and overwintering of the same rusts that attack cereals.

In recent years there has been more interest in the grasses themselves, with the objective of improvement through coordinated work in breeding, selection, and disease control studies. In this connection it has seemed desirable to attempt to assemble and tabulate the vast amount of data, much of it unpublished or buried in seemingly endless publications, so as to make this information more easily available to those interested, directly or indirectly, in grass improvement and culture.

The data thus assembled have been summarized in tables 1 and 2, while the source material from which most of the tabulated information was obtained is listed in the attached bibliography. A summary of the records pertaining to known reactions of 350 species of native and introduced grasses in the United States and Canada to the four rusts mentioned in the introductory paragraph is given in table 1. In table 2 are presented the results recorded in literature or otherwise for the six varieties of stem rust commonly found in North America, viz.: P. graminis agrostidis, P. graminis avenae, P. graminis phleipratensis, P. graminis poae, P. graminis secalis, and P. graminis tritici. It is not practicable in this summary to give the literature citation for each record. Instead, as already stated, a bibliography is appended, showing the sources of the published data included in the tables.

1/ Joint contribution of the Divisions of Cereal and Forage Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture, in cooperation with the State Agricultural Experiment Stations, University of Minnesota and State College of Washington. Grateful acknowledgment is made to Dr. E. C. Stakman, Chief of the Division of Plant Pathology and Botany, University of Minnesota, for many helpful suggestions and constructive criticism. Assistance in the preparation of the typed material was furnished by the personnel of the Work Projects Administration, Official Project No. 165-1-71-124, Sub-project No. 491, sponsored by the University of Minnesota, 1941.

No claim is made that the present summary contains all the pertinent published data in the United States and Canada, although at least a reasonable approach toward completeness has been made. Many unpublished data of the writers have been included, as well as those contributed by others. Unpublished data have been contributed by Dr. Margaret Newton and Dr. Thorvaldur Johnson, Dominion Rust Research Laboratory, Winnipeg, Manitoba; Dr. Roderick Sprague, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Northern Great Plains Field Station, Mandan, North Dakota; Dr. C. L. Lefebvre, Division of Forage Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.; and Mr. Carl Claassen, Washington Agricultural Experiment Station, Pullman, Washington, for which grateful acknowledgment is hereby made.

The symbols used in the tables to denote rust reactions are as follows:

N = Susceptible, as established by natural rusting under field conditions;
A = Susceptible, as indicated by artificial inoculation experiments;
R = Resistant, as demonstrated by inoculation experiments;
F = Failure to become infected as a result of artificial inoculation experiments. The latter ordinarily indicates immunity, but the possibility must always be considered that the inoculated plants may somehow have escaped infection.

Table 1. - Summary of recorded reactions of wild and cultivated grasses to four species of rusts (Puccinia graminis, P. rubigo-vera, P. glumarum, and P. coronata) in the United States and Canada.

Affected grass species[a]	Reaction to rust species: P. graminis	P. rubigo-vera	P. glumarum	P. coronata
Aegilops crassa Boiss.	- - - -	- A - -	- - - - -	- - - -
A. cylindrica Host	N - - -	N A R F	N - - -	- - - -
A. ovata L.	- - - -	N A R -	- - - -	- - - -
A. squarrosa L.	- - - -	- - R F	- - - -	- - - -
A. triuncialis L.	- - - -	- A R F	- - - -	- - - -
Agropyron albicans Scribn. & Smith	- - - -	N - - -	- - - -	- - - -
A. acutum (DC.) Roem. & Schult.	- - - -	- - - -	N A - -	- - - -
A. caninum (L) Beauv.	N - - F	N - R F	N - - -	- - R F
A. ciliare (Trin.) Franch	- - - F	- - - -	N - - -	- - - -
A. cristatum (L) Gaertn.	N A R F	- - - F	N A R -	- - R F
A. dagnae Grossh.	- - - -	- - - -	N - - -	- - - -
A. dasystachyum (Hook.) Scribn.	N A R F	N A - -	N A - -	- - R F
A. desertorum (Fisch.) Schult.	- - R F	- - - F	N A - -	- - R F
A. elmeri Scribn.	- - R F	- - - -	- - - -	- - - -
A. elongatum (Host) Beauv.	- A - F	- - - -	N - - -	- - R F
A. griffithsi Scribn. & Smith	N - - -	- - - -	N A - -	- - - -
A. imbricatum (Stev.) Roem. & Schult.	N - R F	- - - -	- - - -	- - R -
A. inerme (Scribn. & Smith) Rydb.	N A R F	N - - F	N - - -	- - - F
A. intermedium (Host) Beauv.	N - R F	- - - F	N A - -	N - R F
A. obtusiosculum Lange	- - - -	- - - -	N - - -	- - - -
A. orientale (L.) Roem. & Schult.	- - - -	- - - -	N - - -	- - - -
A. pauciflorum (Schwein.) Hitchc.	N A R F	N A R F	N A R F	N - R F
A. pseudorepens Scribn. & Smith	N - - -	N - R F	- - - -	- - - F
A. pungens (Pers.) Roem. & Schult.	- - - -	- - - -	N - - -	- - - -
A. repens (L) Beauv.	N A R F	N A - F	N A - F	N - R F
A. riparium Scribn. & Smith	- - - -	N - - -	N - - -	- - - -
A. saxicola (Scribn. & Smith) Piper	- A - F	N - - -	N - - -	- - - -

[a] Insofar as possible, A. S. Hitchcock's "Manual of the Grasses of the United States" (U. S. Dept. Agr. Misc. Publ. No. 200, 1935) is being followed.

Affected grass species	Reaction to rust species: P. graminis				P. rubigo-vera				P. glumarum				P. coronata			
A. semicostatum (Steud.) Nees	N	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
A. sibiricum (Willd.) Beauv.	N	-	R	F	N	-	-	-	N	-	-	-	-	-	-	-
A. smithii Rydb.	N	A	R	F	N	A	R	F	N	A	-	-	N	-	R	F
A. spicatum (Pursh) Scribn. & Smith	N	A	-	F	N	A	-	F	N	A	-	-	-	-	R	F
A. striatum (Steud.) Nees ex Hookf.	N	-	-	-	-	-	-	-	N	-	-	-	-	-	-	-
A. strigosum (Bieb.) Boiss.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. subsecumdum (Link) Hitchc.	N	A	R	F	N	A	R	F	N	-	-	F	-	-	R	F
Agropyron trichophorum (Link) Richt.	N	-	-	F	-	A	-	-	-	-	-	-	-	-	-	-
A. triticeum Gaertn.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. uganicum Drobov	-	-	-	-	-	-	-	-	N	-	-	-	-	-	-	-
A. villosum (L.) Link	-	-	-	F	-	-	-	F	-	-	-	-	-	-	-	-
Agrostis aequivalvis (Trin.) Trin.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
A. alba L.	N	A	R	F	N	-	-	F	-	-	-	-	N	-	-	F
A. canina L.	N	A	-	-	-	-	-	-	-	-	-	-	N	-	-	F
A. castellana Boiss. & Reut.	-	-	R	F	-	-	-	-	-	-	-	-	N	-	-	-
A. diegoensis Vasey	N	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
A. exarata Trin.	N	A	-	F	-	-	-	-	-	-	-	-	N	-	-	F
A. gigantea Roth	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. hiemalis (Walt.) B. S. P.	N	A	R	F	N	-	-	-	-	-	-	-	-	-	-	-
A. longiligula Hitchc.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
A. oregonensis Vasey	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. palustris Huds.	N	-	R	F	-	-	-	-	-	-	-	-	N	-	-	F
A. perennans (Walt.) Tuckerm.	N	-	-	-	N	-	-	F	-	-	-	-	-	-	-	-
A retrofracta Willd.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
A. scabriglumis Boiss. & Reut.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
A. spica-venti L.	N	A	-	F	-	-	-	-	-	-	-	-	-	-	-	-
A. stolonifera L.	N	A	R	F	-	-	-	F	-	-	-	-	-	-	-	F
A. tenuis Sibth.	N	-	R	F	-	-	-	-	-	-	-	-	N	-	-	-
A. thurberiana Hitchc.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	F
A. verticillata Vill.	-	-	-	F	-	-	-	F	-	-	-	-	-	-	-	-
Alopecurus aequalis Sobol.	N	-	-	-	-	-	-	-	-	-	-	-	N	-	R	F
A. geniculatus L.	N	A	-	F	-	-	-	F	-	-	-	-	-	A	R	-

Affected grass species	Reaction to rust species: P. graminis				P. rubigo-vera				P. glumarum				P. coronata			
A. howellii Vasey	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. myosuroides Huds.	-	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. pratensis L.	N	A	R	F	N	-	-	F	-	-	-	-	N	A	R	F
A saccatus Vasey	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammophila arenaria (L) Link	-	A	-	-	-	-	-	-	-	-	-	-	N	-	R	F
Andropogon furcatus Muhl.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
A. scoparius Michx.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	F
Anthoxanthum aristatum Boiss.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	R	F
A. odoratum L.	N	-	-	F	-	-	-	-	-	-	-	F	-	A	R	F
Arctagrostis latifolia (R.Br.) Griseb.	-	-	-	-	-	-	-	-	-	-	-	-	-	A	-	-
Arrhenatherum elatius (L.) Mert & Koch	N	A	R	F	-	-	-	F	-	-	F	-	N	-	R	F
Arundo donax L.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
Avena abyssinica Hochst.	-	-	-	-	-	-	-	-	-	-	-	-	-	A	-	-
A. barbata Brot.	N	-	-	-	N	-	-	F	-	-	-	-	N	A	R	-
A. brevis Roth	-	-	-	-	-	-	-	-	-	-	-	-	-	A	R	-
A. byzantina K. Koch	N	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
A. diffusa (Neibr.) Aschers & Graebn.	-	-	-	-	-	-	-	-	-	-	-	-	-	A	-	-
A. fatua L.	N	A	-	-	N	-	-	F	-	-	-	-	N	A	R	-
A. hookeri Scribn.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
A. nuda L.	N	-	-	-	-	-	-	-	-	-	-	-	N	A	R	F
A. pubescens Huds.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. sterilis L.	-	-	-	-	-	-	-	-	-	-	-	-	N	A	-	-
A. strigosa Schreb.	-	-	-	-	-	-	-	-	-	-	-	-	-	A	-	-

Affected grass species	Reaction to rust species: P. graminis				P. rubigo-vera				P. glumarum				P. coronata			
Beckmannia erucaeformis (L) Host	N	-	R	F	-	-	-	-	-	-	-	F	N	A	R	F
B. syzigachne (Steud.) Fernald	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bouteloua curtipendula (Michx.) Torr.	N	-	-	F	-	-	-	-	-	-	-	-	-	-	-	F
B. gracilis (H. B. K.) Lag.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
Brachypodium distachyum L.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	F
Briza maxima L.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-
B. media L.	N	-	-	-	-	-	-	F	-	-	-	-	-	-	-	-
B. minor L.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brizopyum siculum Link	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
Bromus adoènsis Höchst.	-	-	-	-	-	-	-	-	-	A	-	-	N	-	-	-
B. anomalus Rupr.	N	-	-	-	N	-	-	F	N	-	-	-	N	A	R	F
B. arvensis L.	-	-	-	-	-	-	-	F	-	-	-	-	-	-	-	F
B. brachystachys Hornuhg	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
B. breviaristatus Buckl.	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
B. brevis Steud.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
B. brizaeformis Fisch. & Mey.	-	-	R	F	-	A	-	F	N	-	-	-	N	-	-	F
B. carinatus Hook. & Arn.	N	-	R	F	N	A	R	F	N	A	R	F	N	-	R	F
B. catharticus Vahl	-	-	R	F	N	-	-	F	N	-	-	-	-	-	-	F
B. ciliatus L.	N	A	R	-	N	A	-	F	N	A	R	F	N	A	R	F
B. commutatus Schrad.	-	-	R	F	N	A	-	F	-	A	-	F	-	-	-	-
B. erectus Huds.	-	-	R	F	-	-	-	F	-	A	-	-	N	-	R	-
B. frondosus (Shear) W. & S.	-	-	-	-	-	-	-	-	-	A	-	-	-	-	-	-
B. grandis (Shear) Hitchc.	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
B. hordeaceus L.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
B. inermis Leyss.	-	-	R	F	N	-	-	F	-	A	R	F	-	-	R	F
B. japonicus Thunb.	N	-	R	F	N	-	-	F	-	-	-	F	-	A	R	F
B. kalmii A. Gray	-	-	R	F	N	-	R	F	-	-	-	-	-	-	-	F
B. lanuginosus Poir	-	-	R	F	-	-	-	-	-	A	-	-	N	-	-	-

Affected grass species	Reaction to rust species: P. graminis				P. rubigo-vera				P. glumarum				P. coronata			
Bromus latiglumis (Shear) Hitchc.	-	-	R	F	N	A	R	F	-	A	R	-	-	A	-	F
B. macrostachys Desf.	-	-	R	F	-	-	-	F	-	A	-	-	N	-	-	-
B. madritensis L.	-	-	R	F	N	-	-	F	-	-	-	-	-	-	-	-
B. mollis L.	N	-	R	F	N	A	R	F	-	A	R	-	-	-	-	F
B. orcuttianus Vasey	N	-	-	-	-	-	-	F	-	-	-	-	-	-	-	-
B. pacificus Shear	-	-	-	F	N	-	-	-	N	-	-	-	N	-	-	-
B. pumpellianus Scribn.	N	-	R	-	N	A	-	F	-	-	-	-	N	A	R	F
B. purgans L.	N	-	R	F	N	A	-	F	N	A	R	F	N	-	R	F
B. racemosus L.	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
B. rigidus Roth.	N	-	R	F	N	-	-	F	-	A	R	-	N	-	R	F
B. rubens L.	-	A	R	F	N	-	-	F	N	-	-	-	-	-	-	-
B. scoparius L.	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
B. secalinus L.	N	-	-	F	N	A	-	F	-	-	-	F	-	-	-	F
B. sitchensis Trin.	N	-	-	-	N	A	-	F	N	-	R	-	-	-	-	-
B. squarrosus L.	-	-	R	F	-	-	-	-	-	-	-	-	-	-	-	-
B. sterilis L.	N	A	R	-	N	A	R	F	-	A	R	F	-	-	-	-
B. suksdorfii Vasey	N	-	-	-	N	-	-	-	N	-	-	-	-	-	-	-
B. tectorum L.	N	A	R	F	N	A	R	F	-	A	-	F	-	-	R	F
B. tomentellus Boiss.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
B. vulgaris (Hook.) Shear	-	-	-	F	N	-	-	F	N	-	-	F	-	-	-	-
Buchloë dactyloides (Nutt.) Engelm.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calamagrostis canadensis (Michx.) Beauv.	N	A	R	F	-	-	-	-	-	-	-	-	N	A	R	F
C. inexpansa A. Gray	N	-	-	-	-	-	-	-	-	-	-	-	N	A	R	F
C. koelerioides Vasey	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
C. montanensis Scribn.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
C. nutkaensis (Presl) Steud.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
C. neglecta (Ehrn.) Gaertn.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
C. purpurascens R. Br.	-	-	-	-	-	-	-	-	-	-	-	-	N	A	-	-
C. rubescens Buckl.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
C. scopulorum Jones	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-

Affected grass species	Reaction to rust species: P. graminis	P. rubigo-vera	P. glumarum	P. coronata
Calamovilfa longifolia (Hook) Scribn.	N - - -	- - - - -	- - - - -	- A - F
Catabrosa aquatica (L.) Beauv.	N - - -	- - - - -	- - - - -	- - - -
Chloris gayana Kunth	- - - -	- - - - -	- - - - -	- - - F
C. verticillata Nutt.	- - - -	- - - - -	N - - -	- - - -
Cinna arundinacea L.	N - - -	N - - -	- - - - -	N - - -
C. latifolia (Trevir.) Griseb.	N - - -	N - - -	- - - - -	N A - F
Corynephorus canescens (L.) Beauv.	N - - -	- - - - -	- - - - -	- - - -
Cynodon dactylon (L.) Pers.	N - - F	- - - - -	- - - - -	- - - F
Cynosurus cristatus L.	- - - F	- - - - -	- - - - -	- - R F
Dactylis glomerata L.	N A R F	- - - F	- - - F	- A R F
Dactyloctenium aegyptium (L.) Richt.	- - - F	- - - - -	- - - - -	- - - F
Danthonia intermedia Vasey	- - - -	- - - - -	- - - - -	- - - F
D. pilosa R. Br.	- - - F	- - - - -	- - - - -	- - - -
D. semiannularis (Labill.) R. Br.	- - - F	- - - - -	- - - - -	- - - -
D. spicata (L.) Beauv.	- - - F	- - - - -	- - - - -	- - - F
D. unispicata Munro	- - - F	- - - - -	- - - - -	- - - -
Deschampsia atropurpurea (Wahl) Scheele	N - - -	- - - - -	- - - - -	- - - -
D. caespitosa (L.) Beauv.	N A - F	- - - - -	- - - - -	N - - F
D. danthonioides (Trin.) Munro.	N - - -	- - - - -	- - - - -	- - - -
D. elongata (Hook) Munro	N A - F	- - - - -	- - - - -	- - - -
D. flexuosa (L.) Trin.	N - - F	- - - F	- - - - -	- - - F

Affected grass species	Reaction to rust species: P. graminis	P. rubigo-vera	P. glumarum	P. coronata
D. flexuosa (L.) Trin.	N - - F	- - - F	- - - -	- - - F
Deschampsia holciformis Presl	N - - -	- - - -	- - - -	- - - -
Digitaria sanguinalis (L.) Scop.	- - - -	- - - -	- - - -	- - - F
Distichlis spicata (L.) Greene	N - - -	- - - -	- - - -	- - - F
Echinochloa crusgalli (L.) Beauv.	N - - F	- - - -	- - - -	- - - F
Elymus ambiguus Vasey & Scribn.	N - - -	N - - -	N - - -	- - - -
E. arenarius L.	N - - -	N - - F	N - - -	- - - -
E. arenicola Scribn. & Smith	N - - -	N - - -	N - - -	- - - -
E. aristatus Merr.	- - - -	- - - -	N - - -	- - - -
E. canadensis L.	N A R F	N A R F	N A R -	N A R F
E. caput-medusae L.	- - - -	- - - -	N - - -	- - - -
E. condensatus Presl	N - - -	N A R F	N A - -	- - - -
E. dahuricus Turcz.	N - R F	- - - -	- A - -	- - - -
E. flavescens Scribn. & Smith	N - - -	- - - -	- - - -	- - - -
E. giganteus Vahl	- - - -	- - - -	N - - -	- - - -
E. glaucus Buckl.	N A R F	N A R F	N A - F	- - - F
E. innovatus Beal	- A R -	- - - F	- - R -	N - - F
E. interruptus Buckl.	- - - -	N A - -	N - - -	- - R F
E. junceus Fisch.	N - - -	N - - -	N - - -	- - - -
E. macounii Vasey	N - - -	N - - -	N - - -	- - R F
E. mollis Trin.	- - - -	N - - -	- - - -	- - - -
E. pseudoagropyrum (Griseb.) Trin.	N - - -	N - - -	N - - -	- - - -
E. sabulosus Bieb.	- - - -	- - - -	N - - -	- - - -
E. salina Jones	- - - -	N - - -	- - - -	- - - -
E. sibiricus L.	N - R F	- - - F	- - - -	- - - -
E. triticoides Buckl.	N A R F	N - - F	N - - -	N - - -
E. vancouverensis Vasey	- - - -	N - - -	- - - -	- - - -
E. villosus Muhl.	- - - F	- - - -	- - - -	- - - -
E. virescens Piper	N - - -	N - - -	N - - -	- - - -
E. virginicus L.	N A R F	N A R F	N A R F	N - - F

Affected grass species	Reaction to rust species: P. graminis	P. rubigo-vera	P. glumarum	P. coronata
Eragrostis abyssinica (Jacq.) Schrad.	- - - -	- - - -	- - - -	- - - F
E. pectinacea (Mich.) Nees	- - - F	- - - -	- - - -	- - - -
Festuca arizonica Vasey	N - - -	- - - -	- - - -	- - - -
F. californica Vasey	N - - -	- - - -	- - - -	- - - -
F. dertonensis (All.) Aschers. & Graebn.	N - - -	- - - -	- - - -	- - - -
F. dumetorum L.	- - - -	- - - F	- - - -	- - - F
F. eastwoodae Piper	N - - -	- - - -	- - - -	- - - -
F. elatior L.	N A R F	- - - F	- - - F	N A R F
F. elmeri Scribn. & Merr.	N - - -	- - - -	- - - -	- - - -
F. fenas Lag.	- - - -	- - - -	- - - -	- - - F
F. gigantea (L.) Vill.	N A - F	- - - F	- - - -	- - R F
F. idahoensis Elmer	N A - F	- - - -	- - - -	- - - -
F. kingii Cassidy	- - - -	- - - -	- - - -	- - R F
F. megalura Nutt.	N - - -	- - - -	- - - -	- - - -
F. myuros L.	N A R F	- - - -	- - - -	- A R F
F. obtusa Spreng.	- - - F	- - - -	- - - -	- - - F
F. occidentalis Hook.	- - - F	- - - -	- - - -	- - - -
F. octoflora Walt.	N A - F	- - - F	N - - -	- A R -
F. ovina L.	- - R F	- - - F	- - - -	- A R F
F. pacifica Piper	N A R F	- - - -	- - - -	- - - -
F. rubra L.	N A - F	N - - F	- - - -	- A R F
F. scabrella Torr.	- - - F	- - - -	- - - -	- - - -
F. subulata Trin.	- - - -	- - - -	- - - -	N - - F
F. tenuifolia Sibth.	- - - -	- - - F	- - - -	- - - -
F. thurberi Vasey	- A R F	- - - -	- - - -	- - - -
F. versuta Beal	- - - -	- - - -	- - - -	- A - F
F. viridula Vasey	- A - F	- - - -	- - - -	- - - -
Fluminea festucacea (Willd.) Hitchc.	- - - -	N - - -	- - - -	N A R F

Affected grass species	Reaction to rust species: P. graminis	P. rubigo-vera	P. glumarum	P. coronata
Glyceria borealis (Nash) Batch	- - - -	- - - F	- - - -	- - - -
G. elata (Nash) Hitchc.	- A - -	- - - -	- - - -	N - - -
G. fluitans (L.) R. Br.	- - - -	- - - -	- - - -	- - - F
G. grandis S. Wats.	N A - F	N - - -	- - - -	N - R F
G. pauciflora Presl	N A - F	- - - -	- - - -	N - - -
G. striata (Lam.) Hitchc.	- A - -	- - - F	- - - -	N - R F
Hierochloë occidentalis Buckl.	N - - -	- - - -	- - - -	- - - -
H. odorata (L) Beauv.	N - - F	- - - -	- - - -	N A R F
Holcus lanatus L.	N A R F	N - - F	- - - -	N A R F
H. mollis L.	- A - F	- - - -	- - - -	- - - F
Hordeum brevisubulatum (Trin.) Link	N - R F	- - - -	N - - -	- - - -
H. bulbosum L.	N - - F	- - - -	- A - -	N - - -
H. gussonianum Parl.	N - R F	- A R F	N A - -	- - - -
H. jubatum L.	N A R F	N A R F	N A - -	- - R F
H. marinum Huds.	- - - -	- - - -	- A - -	N - - -
H. montanense Scribn.	- - - -	- - - -	- - - -	- - - F
H. murinum L.	N A R F	- A R F	N - R F	- A - -
H. nodosum L.	N - - F	N A R F	N A - -	N - - -
H. pusillum Nutt.	N A R -	N A R F	N A - -	- A - -
H. spontaneum C. Koch	- A R F	- - - -	- - - -	- - - -
Hystrix californica Kuntze	- - - -	- - - -	N - - -	- - - -
H. patula Moench	N A R -	N A R F	N A - -	- A R F
Koeleria cristata (L) Pers.	N A - F	N - - F	N - - -	- - R F
Lagurus ovatus L.	N - - -	- - - -	- - - -	N - - F
Lamarckia aurea (L.) Moench	N - - -	- - - -	- - - -	N A R F

Affected grass species	Reaction to rust species: P. graminis				P. rubigo-vera				P. glumarum				P. coronata			
Leptoloma cognatum (Schult.) Chase	-	-	-	-	-	-	-	F	-	-	-	-	-	-	-	F
Limnodea arkansana (Nutt.) L. H. Dewey	N	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
Lolium multiflorum Lam.	N	A	R	F	-	-	-	-	-	-	-	F	N	A	R	F
L. perenne L.	N	A	R	F	-	-	-	F	-	-	-	-	N	A	R	F
L. subulatum Vis.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L. temulentum L.	N	-	R	F	-	-	-	-	-	-	-	F	-	A	R	F
Melica altissima L.	-	-	-	F	-	-	-	F	-	-	-	-	-	-	-	-
M. bulbosa Geyer	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M. geyeri Munro	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
M. mutica Walt.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	F
M. nutans L.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
Milium effusum L.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molinia caerulea (L.) Moench.	N	-	-	-	-	-	-	-	-	-	-	-	-	A	R	F
Muhlenbergia cuspidata (Torr.) Rydb.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
M. mexicana (L.) Trin.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
M. racemosa (Michx.) B.S.P.	N	-	-	F	-	-	-	-	-	-	-	-	-	-	-	F
Panicum virgatum L.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
Paspalum setaceum Michx.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-
Phalaris angusta Nees	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. arundinacea L.	N	A	R	F	-	-	-	-	-	-	-	-	-	A	R	F
P. canariensis L.	N	A	-	F	-	-	-	-	-	A	-	-	N	-	R	F
P. caroliniana Walt.	N	-	-	-	-	-	-	-	-	-	-	-	N	-	-	F
P. paradoxa L.	-	-	-	-	-	-	-	-	N	-	-	-	-	-	-	-
P. tuberosa L.	-	-	-	-	-	-	-	-	-	-	-	-	-	A	-	-

Affected grass species	P. graminis				P. rubigo-vera				P. glumarum				P. coronata			
P. paradoxa L.	-	-	-	-	-	-	-	-	N	-	-	-	-	-	-	-
P. tuberosa L.	-	-	-	-	-	-	-	-	-	-	-	-	-	A	-	-
Phleum boehmeri Wibel.	N	A	R	F	-	-	-	-	-	-	-	-	-	-	-	-
P. paniculatum Huds.	N	A	-	-	-	-	-	-	-	-	-	-	-	A	-	-
P. phleoides (L.) Karst.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. pratense L.	N	A	R	F	-	-	-	-	-	-	-	-	-	A	R	F
Phragmites communis Trin.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F
Poa alpina L.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. ampla Merr.	N	A	R	F	-	-	-	-	-	-	-	-	-	-	-	-
P. annua L.	N	A	R	F	-	-	-	-	-	-	-	-	-	-	R	F
P. arachnifera Torr.	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	F
P. arctica R. Br.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. arida Vasey	N	A	-	F	N	-	-	-	-	-	-	-	-	-	-	-
P. attenuata Trin.	-	A	-	F	-	-	-	-	-	-	-	-	-	-	-	-
P. bulbosa L.	N	A	R	F	-	-	-	-	-	-	-	-	-	-	-	-
P. canbyi (Scribn.) Piper	N	A	R	F	N	-	-	F	-	-	-	-	-	-	-	-
P. chapmaniana Scribn.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. compressa L.	N	A	-	F	-	-	-	-	-	-	-	-	N	-	R	F
P. curta Rydb.	N	A	R	F	-	-	-	-	-	-	-	-	-	-	-	-
P. cusickii Vasey	-	-	R	F	-	-	-	-	-	-	-	-	-	-	-	-
P. epilis Scribn.	N	A	-	F	-	-	-	-	-	-	-	-	-	-	-	-
P. fendleriana (Steud.) Vasey	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
P. fertilis Hegetschw.	-	A	-	-	-	-	-	F	-	-	-	-	-	-	-	-
P. glauca Vahl.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. glaucifolia Scribn. & Will.	-	A	-	F	-	-	-	-	-	-	-	-	-	-	-	-
P. gracillima Vasey	N	A	R	F	-	-	-	-	-	-	-	-	-	-	-	-
P. howelli Vasey & Scribn.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. interior Rydb.	-	-	R	F	N	-	-	-	-	-	-	-	-	-	-	-
P. juncifolia Scribn.	N	A	R	F	N	-	-	-	-	-	-	-	-	-	-	-
P. macrantha Rydb.	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. nemoralis L.	N	A	R	F	-	-	-	F	-	-	-	-	-	-	-	F
P. nervosa (Hook.) Vasey	-	-	R	F	N	-	-	-	-	-	-	-	-	-	-	-
P. nevadensis Vasey	N	A	R	F	N	-	-	-	-	-	-	-	-	-	-	-
P. palustris L.	N	A	R	F	-	-	-	F	-	-	-	-	-	-	-	F
P. pratensis L.	N	A	R	F	N	-	-	F	-	-	-	-	-	-	-	F

Affected grass species	Reaction to rust species: P. graminis				P. rubigo-vera				P. glumarum				P. coronata			
Poa scabrella (Thurb.) Benth.	N	A	R	F	N	-	-	-	-	-	-	-	-	-	-	-
P. secunda Presl.	N	A	R	F	N	-	-	F	-	-	-	-	-	-	-	-
P. sphondylodes Trin.	N	-	R	F	-	-	-	-	-	-	-	-	-	-	-	-
P. stenantha Trin.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
P. sterilis Bieb.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
P. sylvestris A. Gray	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-
P. tibetica Munro	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. trivialis L.	N	-	-	-	-	-	-	F	-	-	-	-	-	-	-	F
Polypogon monspeliensis (L.) Desf.	N	A	-	-	-	-	-	-	-	-	-	-	N	A	R	F
Puccinellia distans (L.) Parl.	N	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
P. maritima (Huds.) Parl.	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
P. nutkaensis (Presl) Fern. & Weath.	N	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
P. nuttalliana (Schult.) Hitchc.	N	-	-	-	N	A	-	F	-	-	-	-	-	-	R	F
P. pumila (Vasey) Hitchc.	-	-	-	-	N	-	-	-	-	-	-	-	-	-	-	-
P. tenuiflora (Griseb.) Scribn. & Merr.	-	-	-	-	N	-	-	-	-	-	-	-	-	A	-	-
Schedonnardus paniculatus (Nutt.) Trel.	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	F
Schizachne purpurascens (Torr.) Swallen	-	-	-	-	-	-	-	-	-	-	-	-	N	-	-	F
Secale montanum Guss.	-	-	-	-	N	A	-	F	N	-	-	-	-	-	-	-
Setaria lutescens (Weigel) F. T. Hubb	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	F
Sitanion hanseni (Scribn.) J. G. Smith	-	-	-	-	-	-	-	-	N	-	-	-	-	-	-	-
S. hystrix (Nutt.) J. G. Smith	N	A	-	F	N	A	R	F	N	A	-	-	-	-	-	-
S. jubatum J. G. Smith	N	A	-	F	N	-	-	F	N	A	-	-	-	-	-	-

Affected grass species	Reaction to rust species: P. graminis	P. rubigo-vera	P. glumarum	P. coronata
Sorghastrum nutans (L.) Nash	N - - -	- - - -	- - - -	- - - -
S. halepense (L.) Pers.	- - - F	- - - -	- - - -	- - - F
Spartina cynosuroides (L.) Roth	- - - -	- - - -	- - - -	- - - F
S. gracilis Trin.	- - - -	- - - -	- - - -	- - R F
Sphenopholis nitida (Spreng.) Scribn.	- - - F	- - - -	- - - -	- - - F
S. obtusata (Michx.) Scribn.	N A - -	- - - F	- - - -	- - R F
S. pallens (Spreng.) Scribn.	- - - -	- - - F	- - - -	- - - -
Sporobolus asper (Michx.) Kunth.	N - - F	- - - F	- - - -	- - - F
Sporobolus cryptandrus (Torr.) A. Gray	N - R F	- - - -	- - - -	- - R F
S. heterolepis (A. Gray) A. Gray	- - - -	- - - -	- - - -	- - - F
Stipa comata Trin. and Rupr.	N - - -	- - - -	- - - -	- - - F
S. coronata Thurb.	N - - -	- - - -	- - - -	- - - -
S. pulchra Hitchc.	N - - -	- - - -	- - - -	- - - -
S. spartea Trin.	- - - -	- - - -	- - - -	- - - F
S. viridula Trin.	- - - -	- - - -	- - - -	- - R F
Triodia flava (L.) Smyth	N - - F	- - - -	- - - -	- - - F
Trisetum canescens Buckl.	N - - -	- - - -	- - - -	N - - -
T. cernuum Trin.	- - - -	- - - -	N - - -	N - - -
T. flavescens (S.) Beauv.	- A R F	- - - -	- - - -	- A - F
T. montanum Vasey	- - - -	N - - -	- - - -	- - - -
T. sesquiflorum Trin.	N - - -	- - - -	- - - -	- - - -
T. spicatum (L.) Richt.	- A - F	N - - F	- - - -	N - R F

Table 2. Summary of recorded reactions of wild and cultivated grasses to six varieties of *Puccinia graminis* in the United States and Canada.

Affected grass species [a]	Reaction to stem rust varieties: Puccinia graminis: agrostidis	avenae	phleiprat.	poae	secalis	tritici
Agropyron caninum (L.) Beauv.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. ciliare (Trin.) Franch	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. cristatum (L.) Gaertn.	- - - -	- - R F	- - - F	- - - -	N A R F	N A R F
A. dasystachyum (Hook.) Scribn.	- - - -	- - R F	- - R -	- - - -	- A - -	N A R -
A. desertorum (Fisch.) Schult.	- - - -	- - - F	- - - -	- - - -	- - - F	- - R F
A. elmeri Scribn.	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
A. elongatum (Host) Beauv.	- - - -	- - - F	- - - -	- - - -	- A - -	- A - -
A. imbricatum (Stev.) Roem. & Schult.	- - - -	- - - F	- - - -	- - - -	N - R F	- - - F
A. inerme (Scribn. & Smith) Rydb.	- - - -	- - R F	- - - -	- - - -	- - - -	N - - -
A. intermedium (Host) Beauv.	- - - -	- - - F	- - - -	- - - -	- - R -	- - R F
A. pauciflorum (Schwein.) Hitchc.	- - - -	- - R F	- - R -	- - - -	N A - -	N A R F
A. repens (L.) Beauv.	- - - -	- - - F	- - - F	- - - -	N A - -	N - R F
A. saxicola (Scribn. & Smith) Piper	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. semicostatum (Steud.) Nees	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. sibiricum (Willd.) Beauv.	- - - -	- - - F	- - - -	- - - -	- - R -	- - - F
A. smithii Rydb.	- - - -	- - - F	- - - F	- - - -	N A - -	N A R -
A. spicatum (Pursh) Scribn. & Smith	- - - -	- - - F	- - - -	- - - -	- A - -	- A - F
A. subsecundum (Link) Hitchc.	- - - -	- - R F	- - R -	- - - -	N A - -	N A - -
A. trichophorum (Link) Richt.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. triticeum Gaertn.	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
A. villosum (L.) Link	- - - -	- - - F	- - - -	- - - -	- - - -	- - - F
Agrostis alba L.	N A - -	- - R F	- - - F	- - - F	- - - F	- - R F
A. canina L.	- A - -	- - - -	- - - -	- - - -	- - - -	N - - -
A. castellana Boiss. & Reut.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. exarata Trin.	- - - -	N - - F	- - - -	- - - -	- - - -	- - - -
A. hiemalis (Walt.) B.S.P.	N - - -	- A - -	- - - -	- - - -	- - - -	- - - -

[a] Insofar as possible, A. S. Hitchcock's "Manual of the Grasses of the United States" (U. S. Dept. Agr. Misc. Publ. No. 200, 1935) is being followed.

a/ Insofar as possible, A. S. Hitchcock's "Manual of the Grasses of the United States" (U. S. Dept. Agr. Misc. Publ. No. 200, 1935) is being followed.

Affected grass species	Reaction to stem rust varieties: Puccinia graminis: agrostidis	avenae	phleiprat.	poae	secalis	tritici
A. oregonensis Vasey	N - - -	- - - -	- - - -	- - - -	- - - -	- - - -
A. palustris Huds.	N - - -	- - R -	- - - -	- - - -	- - - -	- - - -
A. retrofracta Willd.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. spica-venti L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. stolonifera L.	N A - -	- - R F	- - - -	- - - -	- - - F	- - - F
A. tenuis Sibth.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
A. verticillata Vill.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Alopecurus geniculatus L.	- A - -	- A - -	- A - -	- - - -	- - - F	- - - F
A. myosuroides Huds.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
A. pratensis L.	N A - -	N A R -	- A - F	- - - -	- - - F	- - R F
Ammophila arenaria (L.) Link	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
Andropogon scoparius Michx.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Anthoxanthum aristatum Boiss.	- - - -	N - - -	- - - -	- - - -	- - - -	- - - -
A. odoratum L.	- - - F	N - - F	- - - -	- - - -	- - - F	- - - F
Arrhenatherum elatius (L.) Mert. & Koch	- - - -	N A R -	- A R -	- - - -	- - - F	- - - F
Avena fatua L.	- - - -	N - - -	- A - -	- - - -	- - - -	- - - -
Beckmannia erucaeformis (L.) Host	- - - -	- - R F	- - - F	- - - -	- - - F	- - - F
Bouteloua curtipendula (Michx.) Torr.	- - - -	- - - F	- - - -	- - - -	- - - F	- - - F
Brachypodium distachyum L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Brizopyrum siculum Link	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -

Affected grass species	Reaction to stem rust varieties: Puccinia graminis: agrostidis	avenae	phleiprat.	poae	secalis	tritici
Bromus brachystachys Horn	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
B. brevis Steud.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
B. brizaeformis Fisch. & Mey	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
B. carinatus Hook & Arn.	- - - -	- - - F	- - - -	- - - -	- - - -	- - R -
B. catharticus Vahl.	- - - -	- - R F	- - - -	- - - -	- - - -	- - R -
B. ciliatus L.	- - - -	- A R -	- - - -	- - - -	- - - -	- - - -
B. commutatus Schrad.	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
B. erectus Huds.	- - - -	- - R F	- - - -	- - - -	- - - -	- - - F
B. hordeaceus L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
B. inermis Leyss.	- - - F	- - R F	- - R -	- - - -	- - - F	- - R F
B. japonicus Thunb.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
B. kalmii A. Gray	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
B. lanuginosus Poir	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
B. latiglumis Hitchc.	- - - -	- - R -	- - - F	- - - -	- - - F	- - - F
B. macrostachys Desf.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
B. madritensis L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
B. mollis L.	- - - -	N - R F	- - - F	- - - -	- - R -	- - R F
B. pacificus Shear	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
B. pumpellianus Scribn.	- - - -	- - - -	- - - -	- - - -	- - - -	- - R -
B. purgans L.	- - - -	- - R -	- - - F	- - - -	- - R F	- - - F
B. rigidus Roth	- - - -	N - R -	- - - -	- - - -	- - - -	- - R -
B. rubens L.	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
B. secalinus L.	- - - -	N - - F	- - - -	- - - -	- - - -	- - - -
B. sitchensis Trin.	- - - -	- - - -	- - - -	- - - -	N - - -	N - - -
B. squarrosus L.	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
B. sterilis L.	- - - -	N - R -	- - R -	- - - -	- - R -	- A - -
B. suksdorfii Vasey	- - - -	N - - -	- - - -	- - - -	- - - -	- - - -
B. tectorum L.	- A - -	N A R -	- - R -	- - - -	N A R F	N A R -
B. tomentellus Boiss.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Calamagrostis canadensis (Michx.) Beauv.	- - R -	- A - -	- - - -	- - - -	- - - -	- - - F
Cynodon dactylon (L.) Pers.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - F

Affected grass species	Reaction to stem rust varieties: Puccinia graminis: agrostidis	avenae	phleiprat.	poae	secalis	tritici
Beauv.	- - R -	- A - -	- - - -	- - - -	- - - -	- - - F
Cynodon dactylon (L.) Pers.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - F
Cynosurus cristatus L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - F
Dactylis glomerata L.	- A - -	N A - -	N A R -	- - - F	- - - F	N A R F
Dactyloctenium aegyptium (L.) Richt.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Danthonia pilosa	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
D. spicata (L.) Beauv.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Deschampsia caespitosa (L.) Beauv.	- - - -	- A - -	- - - -	- - - -	- - - -	N - - -
D. elongata (Hook.) Munro	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
D. flexuosa (L.) Trin.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Echinochloa crusgalli (L.)Beauv.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Elymus ambiguus Vasey & Scribn.	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
E. canadensis L.	- - - -	- - R F	- - R -	- - - -	N A - -	N A - -
E. condensatus Presl.	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
E. dahuricus Turcz.	- - - -	- - R -	- - R -	- - - -	- - R -	N - - F
E. flavescens Scribn. & Smith	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
E. glaucus Buckl.	- - - -	- - R F	- A R -	- - - -	N A - -	N A - -
E. innovatus Beal	- - - -	- A - -	- - R -	- - - -	- A - -	- A - -
E. junceus Fisch.	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
E. macounii Vasey	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
E. sibiricus L.	- - - -	- - - F	- - - -	- - - -	- - - -	N - - -
E. triticoides Buckl.	- - - -	- - - F	- - - -	- - - -	- A - -	N A - -
E. villosus Muhl.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
E. virescens Piper	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
E. virginicus L.	- - - -	- - R F	- - R F	- - - -	N A R -	N A R F
Eragrostis abyssinica (Jacq.) Link	- - - -	- - - F	- - - F	- - - -	- - - F	- - - F

Affected grass species	Reaction to stem rust varieties: Puccinia graminis: agrostidis	avenae	phleiprat.	poae	secalis	tritici
Eragrostis pectinacea (Michx.) Nees	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Festuca dertonensis (All.) Aschers & Graebn.	- - - -	N - - -	- - - -	- - - -	- - - -	- - - -
F. elatior L.	- - - -	- A R F	N A - -	- - - -	- - - F	- - - F
F. gigantea (L.) Vill.	- - - -	- - - F	- - - -	- - - -	- - - -	- A - -
F. idahoensis Elmer	- - - -	- - - F	N - - -	- - - -	- - - -	- - - -
F. myuros L.	- - - -	N A - -	- A R -	- - - -	- - R -	- - - F
F. obtusa Spreng.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
F. occidentalis Hook.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
F. octoflora Walt.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
F. ovina L.	- - - -	- - R F	- - - F	- - - -	- - - -	- - - F
F. pacifica Piper	- - - -	- A R -	- A R -	- - - -	- - - F	- - - F
F. rubra L.	- - - -	- - - F	- - - F	- - - -	- - - -	- - - F
F. scabrella Torr.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
F. thurberi Vasey	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
F. viridula Vasey	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
Glyceria canadensis (Michx.) Trin.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
G. pauciflora Presl	- - - -	N - - F	- - - -	- - - -	- - - -	- - - -
Hierochloe odorata (L.) Beauv.	- - - -	N - - -	- - - -	- - - -	- - - -	- - - -
Holcus lanatus L.	- A - -	N A R -	- A - F	- - - -	- - - F	- - - F
H. mollis L.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - F
Hordeum brevisubulatum (Trin.) Link.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
H. bulbosum L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
H. gussonianum Parl.	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
H. jubatum L.	- - - F	- - - F	- - R -	- - - -	N - A -	N A - -
H. murinum L.	- - - -	- A R F	- - - F	- - - -	N - R -	N A R -
H. nodosum L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - F

Affected grass species	Reaction to stem rust varieties: Puccinia graminis: agrostidis	avenae	phleipratensis	poae	secalis	tritici
H. nodosum L.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - F
H. pusillum Nutt.	- - - -	- - R -	- - - -	- - - -	N A - -	N A - -
H. spontaneum C. Koch	- - - -	- - R F	- - - -	- - - -	- - - -	- A - -
Hystrix patula Moench	- - - -	- - R -	- - - -	- - - -	N A - -	N A - -
Koeleria cristata (L.) Pers.	- A - -	N A - F	N A - -	- - - -	- - - F	- A - F
Limnodea arkansana (Nutt.) L. H. Dewey	- - - -	N - - -	- - - -	- - - -	- - - -	- - - -
Lolium multiflorum Lam.	- - - -	- - R -	- A R -	- - - -	- - - -	- - - F
L. perenne L.	- - - -	- - R F	- A R -	- - - -	- - - F	- - - F
L. temulentum L.	- - - -	- - R -	- - - -	- - - -	- - - -	- - - F
Melica altissima L.	- - - -	- - - -	- - - -	- - - -	- - - -	- - - F
Milium effusum L.	- - - -	N - - -	- - - -	- - - -	- - - -	- - - -
Muhlenbergia racemosa (Michx.) B.S.P.	- - - -	- - - F	- - - F	- - - -	- - - F	- - - F
Panicum virgatum L.	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
Phalaris arundinacea L.	- - - -	- A - F	- - - -	- - - -	- - - -	- - - -
P. canariensis L.	- - - F	N A - -	- A - -	- - - -	- - - F	- - - F
Phleum boehmeri Wibel.	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
P. paniculatum Huds.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
P. pratense L.	- - - -	N A R F	N A - -	- - - F	- - - F	- - - F
Poa ampla Merr.	- - - -	- A R F	- - - -	- - - -	- - - -	- - - -
P. annua L.	- - - -	- - - F	- - - -	- A - F	- - - -	- - - -
P. arida Vasey	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. attenuata Trin.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. bulbosa L.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -

	Reaction to stem rust varieties: Puccinia graminis:					
	agrostidis	avenae	phleiprat.	poae	secalis	tritici
P. canbyi (Scribn.) Piper	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
P. compressa L.	- - - -	- - - F	- - - F	N A - -	- - - -	- - - F
P. curta Rydb.	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
P. cusickii Vasey	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
P. epilis Scribn.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. fertilis Hegetschw.	- - - -	- - - -	- - - -	- A - -	- - - -	- - - -
P. glaucifolia Scribn. & Will.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
P. gracillima Vasey	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
P. interior Rydb.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. juncifolia Scribn.	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
P. nemoralis L.	- - - -	- - - F	- - - -	- A - F	- - - -	- - - F
P. nervosa (Hook.) Vasey	- - - -	- - R -	- - - -	- - - -	- - - -	- - - -
P. nevadensis Vasey	- - - -	N A R F	- - - -	- - - -	- - - -	- - - -
P. palustris L.	- - - -	- - - F	- - - -	- A - F	- - - -	- - - -
P. pratensis L.	- - - -	- - - F	- - - -	N A - -	- - - -	- - - F
P. scabrella (Thurb.) Benth.	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
P. secunda Presl	- - - -	- - R F	- - - -	- - - -	- - - -	- - - -
P. sphondylodes Trin.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. stenantha Trin.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. sterilis Bieb.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. sylvestris A. Gray	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
P. trivialis L.	- - - -	N - - -	- - - -	- - - -	- - - -	- - - -
Polypogon monspeliensis (L.) Desf.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
Schedonnardus paniculatus (Nutt.) Trel.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Sitanion hystrix (Nutt.) J. G. Smith	- - - -	- - - F	- - - -	- - - -	- - - -	N - - -
S. jubatum J. G. Smith	- - - -	- - - F	- - - -	- - - -	- - - -	N - - -
Sorghum halepense (L.) Pers.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -

	Reaction to stem rust varieties: Puccinia graminis:					
	affected					

Affected grass species	Reaction to stem rust varieties: Puccinia graminis: agrostidis	avenae	phleipratensis	pomae	secalis	tritici
Sorghum halepense (L.) Pers.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Sphenopholis nitida (Spreng.) Scribn.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
S. obtusata (Michx.) Scribn.	- - - -	N A - -	- - - -	- - - -	- - - -	- - - -
Sporobolus asper (Michx.) Kunth.	- - - -	- - - F	- - - -	- - - -	- - - -	- - - F
S. cryptandrus (Torr.) A. Gray	- - - -	- - - F	- - - -	- - - -	N - - -	N - - R
Stipa pulchra Hitchc.	- - - -	- - - -	- - - -	- - - -	- - - -	N - - -
S. viridula Trin.	- - - -	- - R F	- - - F	- - - -	- - - F	- - - F
Triodia flava (L.) Smith	- - - -	- - - F	- - - -	- - - -	- - - -	- - - -
Trisetum flavescens (L.) Beauv.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -
T. spicatum (L.) Richt.	- - - -	- A - -	- - - -	- - - -	- - - -	- - - -

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